

**REMARKS**

Claims 11-19, 23-25, and 27, 28, and 30-33 are pending in this application. Non-elected claims 12, 14-16, 18, 19, 24, 25, 27, 28, 30, and 31 are withdrawn from consideration by the Examiner. By this Amendment, claims 11, 12, 15, and 32 are amended, and claims 21 and 22 are canceled. Support for the amendments to the claims may be found, for example, in the original claims. No new matter is added.

In view of the foregoing amendments and following remarks, reconsideration and allowance are respectfully requested.

**I. Rejection Under 35 U.S.C. §103**

**A. Claims 11, 13, 17, 23, and 33**

The Office Action rejects claims 11, 13, 17, 23, 32, and 33 under 35 U.S.C. §103(a) as allegedly having been obvious over U.S. Patent No. 6,686,505 to Watanabe et al. ("Watanabe") in view of JP 11-189600 to Ikariya et al. ("Ikariya"). Applicants respectfully traverse the rejection.

Claim 11 is directed to a process for producing an optically active alcohol comprising placing a metal complex represented by general formula (1) and a ketone compound in a polar solvent, without the presence of a base, and stirring the mixture under pressurized hydrogen to hydrogenate the ketone compound. The applied references would not have rendered obvious the claimed subject matter for at least the following reasons.

One of ordinary skill in the art would not have had any reason or rationale to modify Watanabe's process suitable for a ruthenium complex having three ligands to include Ikariya's hydrogenation process suitable for a ruthenium complex having four ligands. The Office Action asserts that "Ikariya also teaches complexes that have three ligands (see for example paragraph 0011, wherein the formula (3) compound n can be zero). Thus, the teachings of

Ikariya are applicable to ruthenium complexes having three or four ligands." See Office Action at page 3. Applicants respectfully disagree.

The compound represented by Formula (3) of Ikariya defines n to be 0 to 4, and also defines m to be 0 to 4. See Ikariya at paragraphs [0011] and [0012]. Applicants submit that, in view of the teachings of Ikariya, n and m are erroneously defined. For example, an embodiment where both n and m are 0 means that the compound is applicable as a hydrogenation catalyst to a complex that has neither a phosphine ligand nor an amine ligand. However, Ikariya teaches that at least one of a phosphine ligand or an amine ligand is required. See paragraph [0015] (stating that "the present invention provides a producing method of an alcohol compound, particularly an optically active alcohol compound, by reducing a carbonyl compound in the presence of hydrogen gas or a hydrogen-donating compound, using the above-described ruthenium complex as a catalyst, particularly a ruthenium complex in which at least one of the phosphine ligand and the amine ligand in the formulae (1)-(4) is optically active").

In fact, Ikariya explicitly teaches that both phosphine and amine ligands are required in its ruthenium complex. Specifically, paragraph [0018] of Ikariya teaches "the ruthenium complexes expressed by the formulae (1)-(4) have a phosphine ligand and an amine ligand." Additionally, all of the exemplary ruthenium complexes disclosed in Ikariya contain four ligands, of which two are phosphine and amine ligands. See, e.g., Examples. Based on the teachings of Ikariya, one of ordinary skill in the art would have understood that converting a carbonyl compound into an alcohol compound in the presence of hydrogen gas or a hydrogen-donating compound could not be practically achieved by using a catalyst having three ligands.

The Office Action further asserts that the record lacks evidence that "Watanabe's ruthenium complex [having] three ligands while Ikariya's complex [having] four ligands will

affect the ability of pressurized hydrogen to be effective for reducing the ketone in the process of Watanabe." Applicants respectfully disagree.

The references of record provide evidence that a ruthenium complex having four ligands would significantly affect the ketone reduction process of Watanabe. As discussed above, Ikariya explicitly teaches that both phosphine and amine ligands are required in its ruthenium complex. Ikariya further teaches that when at least one of the remaining ligands, X and Y, is not a hydrogen, the ruthenium complexes of Formulae (1)-(4) of Ikariya reduces a ketone only when a carbonyl compound is hydrogenated by applying hydrogen pressure or by a hydrogen donor in the presence of a base. See paragraph [0040]. Thus, Ikariya requires that both X and Y must be hydrogen in order to reduce a ketone by applying hydrogen pressure or by a hydrogen donor without the presence of a base. This is further supported by the working examples of Ikariya. Examples 12 and 14 describe that when both X and Y are a hydrogen, that is, when the complex is  $\text{RuH}_2(\text{P-P})(\text{N-N})$ , the complex hydrogenates a carbonyl compound without adding a base. In contrast, Examples 11 and 13 describe that when at least one of X and Y is not a hydrogen, the complex hydrogenates a carbonyl compound with the addition of a base.

In contrast to Ikariya's complex that requires both X and Y to be hydrogen to reduce a ketone without the presence of a base, the ketone reducing ability of Watanabe's complex is minimal when any of the X and Y positions is hydrogen. Specifically, Haack teaches there is little hydrogenation of a ketone under hydrogen gas when using  $\text{RuH}[(\text{S,S})\text{-Tspden}](\text{p-cymene})$ , the complex disclosed in Watanabe ( $\text{RuCl}[(\text{S,S})\text{-Tspden}](\text{p-cymene})$ ) with a hydrogen at the X, Y position. See Haack, J. Am. Chem. Soc., Vol. 118, No. 10, page 2522, right column, lines 22-28 (attached with the September 15, 2010 Amendment). Therefore, the evidence of record shows that Ikariya's complex having four ligands significantly affects

the ability of pressurized hydrogen to be effective for reducing the ketone in the process of Watanabe.

For at least the reasons discussed above, one of ordinary skill in the art would not have had any reason or rationale to modify Watanabe's process to include Ikariya's hydrogenation process.

Furthermore, Ikariya's active catalyst with a complex where both X and Y are hydrogen is very unstable and, thus, cannot be isolated. As seen in Example 3 of Ikariya, although 130mg of dark red-colored compound was obtained, this merely represents a concentration of the reaction mixture, and does not represent the isolation of a dihydride complex. Thus, one of ordinary skill in the art would have recognized that, in practice, Ikariya's method is unable to hydrogenate an unstable ketone that is unstable to a base. Indeed, the claimed method reduces an unstable ketone that is unstable to a base. The working examples of the specification demonstrate that the recited metal complex hydrogenates a ketone under pressurized hydrogen without a base when X is an anionic group other than a hydrogen. The recited metal complex, in which X is an anionic group other than a hydrogen, is a stable compound, and can be isolated and weighed in air for practical use. Thus, Applicants have discovered the source of a problem solved by the claimed method, which is a part of the "subject matter as a whole" analysis that must be considered by the Examiner. See MPEP §2141.02(III).

**B. Claim 32**

The Office Action asserts that Watanabe discloses a ketone compound having a halogen substituent at an  $\alpha$ -position. See page 3. By this Amendment, claim 32 is amended to delete "a halogen substituent at  $\alpha$ -position" to distinguish the claimed method over the method disclosed in Watanabe.

**C. Conclusion**

For at least these reasons, the applied references would not have rendered obvious claim 11 and its dependent claims. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

**II. Rejoinder**

Applicants respectfully request rejoinder of non-elected claims 12, 14-16, 18, 19, 24, 25, 27, 28, 30, and 31. This application is subject to unity of invention practice as set forth in PCT Rule 13. *See* MPEP §1893.03(d). Because claims 12 and 15 are substantially coextensive with claim 11, they share at least one special technical feature with claim 11. Claims 14, 16, 18, 19, 24, 25, 27, 28, 30, and 31 variously depend from claims 12 or 15. Thus, unity of invention exists between all the claims. Applicants respectfully request withdrawal of the Restriction Requirement and rejoinder of the non-elected claims.

**III. Conclusion**

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of this application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Attachments:

Petition for Extension of Time  
Request for Continued Examination

Date: December 16, 2011

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